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ABSTRACT

As part of a series of tests to measure mastery of specific skills in the natural sciences, print masters of tests 66 through 91 are provided. Among the areas covered are: carbon compounds; evolution; map reading; genetics; energy; chemical formulae; electricity; graphs; metric measures; solubility; and physical separations. Many tests contain stimulus material on the first page referent to questions on the second, formatted for reproduction. The multiple choice questions were written for students in grades 7 through 10. An answer key is provided. (CM)

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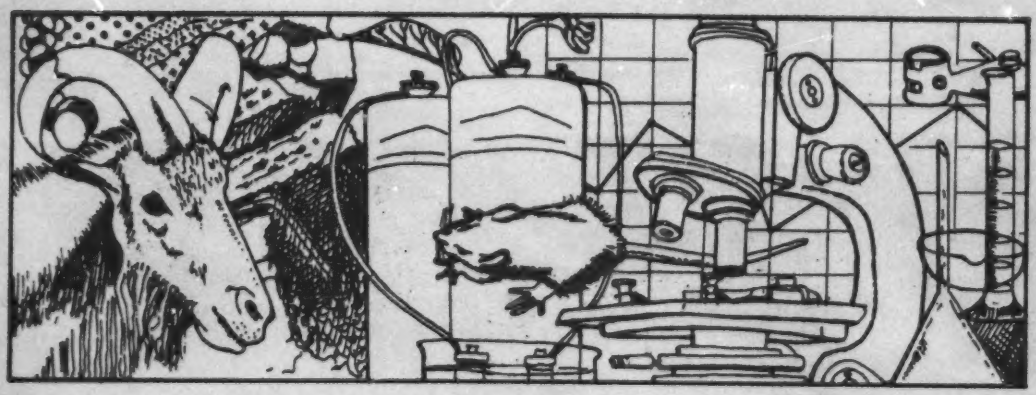
MASTERY TESTING PROGRAM

SERIES 6



TM 820 495

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ISBN-0-7240-4713-1

SCIENCE

MASTERY TESTING PROGRAM

SERIES 6

Produced by the

Assessment and Evaluation Unit

Directorate of Studies

Department of Education

NSW 1982

INTRODUCTION

This is Series 6 of the Science Mastery testing program. It contains 26 mastery tests numbered M56 - M91 as per the contents list.

The format of these is different to the previous 65 tests. However the same philosophy still applied for the use of these, and the previous mastery tests. May I repeat it here.

> MASTERY TESTS SHOULD NOT BE USED TO RANK OR GRADE STUDENTS!!
>
> DO NOT SCORE MARKS FOR MASTESY TESTS!!
>
> YOU SHOULD ONLY RECORD WHETHER OR NOT A STUDENT HAS MASTERED THE CONCEPT BEING TESTED!!

The tests have been printed on foolscap so that their duplication in schools is easier. It is becoming uneconomic for us to produce and store class sets of mastery tests for schools to obtain on request.

In future, schools will be issued with print masters only, and can choose for themselves the tests they wish to dup'icate.

It is hoped that the previous 65 tests will be converted to foolscap print masters in the near future.

Brian Shadwick
Subject Officer (Science)
Assessment and Evaluation Unit
Directorate of Studies
Department of Education. N.S.W.

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Reproducing these Tests

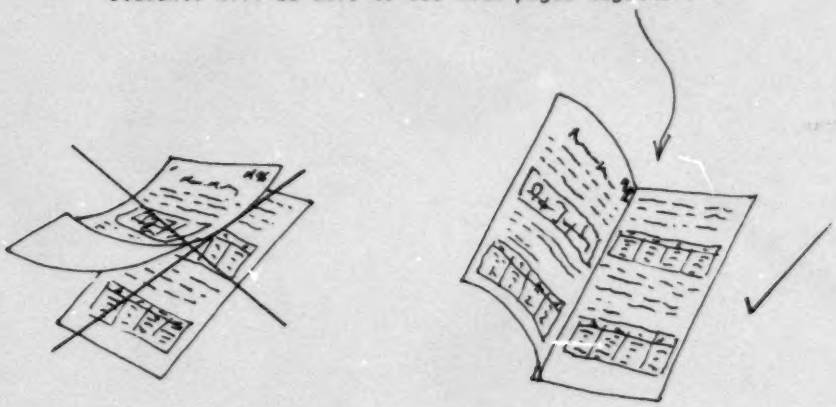
Many of these tests contain stimulus material on the first page. Questions which refer to this stimulus material often carry over on to the second page.

For this reason, when you are compiling copies of the tests for student use you should either:-

a) leave the two pages of each test loose so that students can place the first in a position such that they can refer to it while they are working on the second page,

or

b) staple the pages together so that they face each other, as they have been printed in this book. In this way students will be able to see both pages together.



If several tests are relevant to one of your teaching units you may choose to make up a small booklet of these printed this way. This would allow printing on both sides of the paper and therefore would conserve paper.

i.e. page 1 of test B would be on the back of page 2 of test A.

SCIENCE

MASTERY TESTING PROGRAM KEYS

TEST No.	QUESTION																												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
M66	A	D	B	C	A	C	D	B	B	A																				
M67	D	B	D	C	A	D	A	A	D	A	A	B	B	B	C															
M68	B	C	A	D	C	B	C	B	A	C	A	B	A	D	D	B	B	C	C	C										
M69	A	C	C	D	D	D	C	B	D	D	D	A	B	C	B	A	B	D	C	D										
M70	B	B	D	D	B	B	A	C	C	D	C	A	C	D	C	D	D	B	B	B										
M71	B	A	A	D	D	C	B	A	A	D	B	C	A	B	B	D	D	A	B	D	C	A	C	C	D					
M72	A	C	C	D	B	C	B	A	B	D	D	A	C	B	C															
M73	B	C	B	D	A	C	D	B	C	D	C	A	A	A	D															
M74	A	B	A	C	A	D	A	B	C	D	A	C	D	B	C															
M75	C	B	C	A	B	A	D	C	C	B	C	B	A	D	B	B	B	B	C	B										
M76	A	C	A	B	A	D	A	B	D	A	D	A																		
M77	C	B	B	B	B	D	B	B	A	A	B	C	D	D	A															
M78	B	A	C	A	B	D	C	D	B	D	A	B	C	B	B	C	B	A	B	D										
M79	A	B	C	D	B	A	C	D	D	B	A	C	B	D	A															
M80	B	C	D	C	A	C	A	B	D	C	D	B	C	C	A	A	A	C	D	D										
M81	C	D	B	A	B	C	D	A	B	A																				
M82	C	C	D	A	B	D	C	C	B	A	D	C	B	C	A	B	B	D	B	A										
M83	B	C	A	D	D	A	D	A	B	D	B	C	A	C	A	C	C	A	D	D										
M84	A	B	B	D	D	B	A	D	C	B	B	A	D	C	C	A	B	B	C	A										
M85	B	C	B	A	A	A	A	B	B	C	C	D	D	D	B	B	B	D	B	B										
M86	D	D	C	A	C	B	B	C	B	C	B	A	B	C	C	B	B	D	C	A	B	D	B	A	C					
M87	B	A	B	B	A	A	A	B	C	D	C	D	C	C	D															
M88	A	B	B	C	C	C	B	D	A	D	B	D	C	A	C															
M89	C	D	C	B	D	B	C	B	A	B	A	B	B	C	D	B	B	C	D	D	D	D	C	C	B	A	B	A	A	A
M90	D	C	A	B	B	A	A	C	D	D	C	A	A	B	D	D	A	B	A	C										
M91	D	A	B	D	C	C	C	A	B	B	C	B	B	A	B															

SERIES 6

NAMING CARBON COMPOUNDS (2)

This test is designed to measure your ability to apply the rules for naming carbon compounds.

Read the information given in the table below and use it to answer the questions which follow.

Carbon compounds are named using two features of the structure of the molecule

(1) the number of carbon atoms present
(2) the type of distinguishing feature present

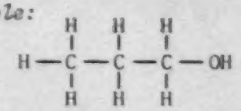
Conventions used are shown below.

No. of "C" atoms in compound	Prefix
1	METH-
2	ETH-
3	PROP-
4	BUT-
5	PENT-
6	HEX-

Distinguishing Feature	Suffix
—OH group	-ANOL
—C(=O)H group	-ANAL
—C(=O)OH group	-ANOIC ACID
—C(=O)— group	-ANONE

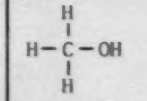
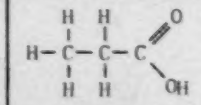
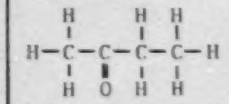
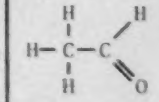
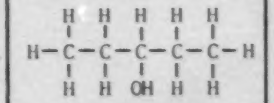
The name of the compound is found by working out which prefix and suffix should be used and then simply putting them together.

Example:

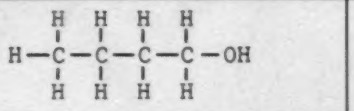
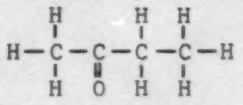
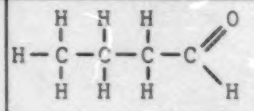
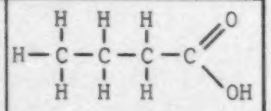
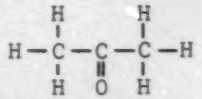
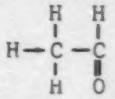
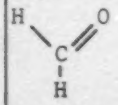
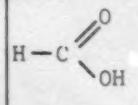
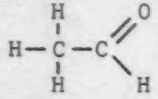
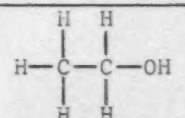
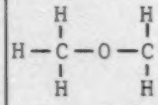
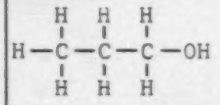
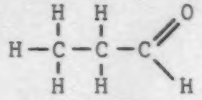
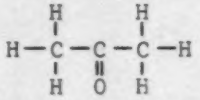
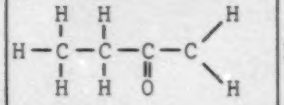
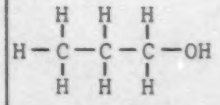
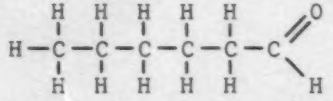
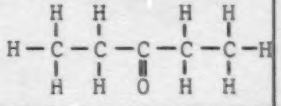
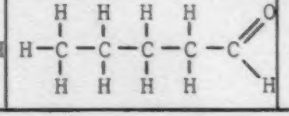
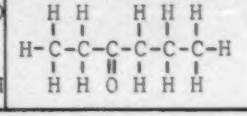


Prefix: 3 carbon atoms = Prop
Suffix: -OH group = -anol
Name: Propanol

Set 1: Choose the correct name for each structure given and mark its letter (A, B, C or D) on your answer sheet.

Q.	STRUCTURE	Questions A	B	C	D
1.		Methanol	Methanal	Ethanol	Ethanal
2.		Ethanol	Ethanoic Acid	Propanone	Propan-oic acid
3.		Propanol	Butanone	Butanal	Pentan-oic acid
4.		Methan-oic acid	Ethanoic Acid	Ethanal	Ethanone
5.		Pentanol	Pentanone	Butanol	Hexanone

Set 2 Choose the correct structure for each name given and mark its letter (A, B, C or D) on your answer sheet

QUESTION	SUBSTANCE	POSSIBLE ANSWERS			
		A	B	C	D
6.	Butanal				
7.	Methanoic Acid				
8.	Ethanol				
9.	Propanone				
10.	Hexanal				

M67

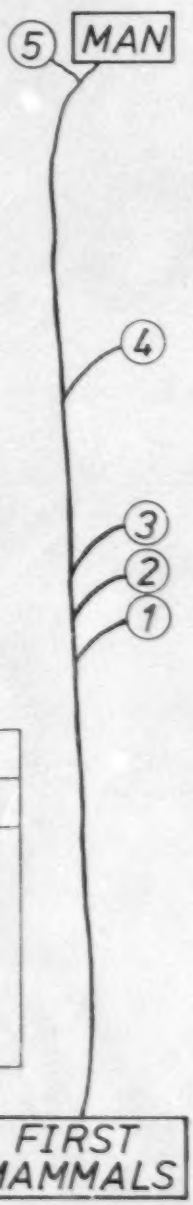
EVOLUTIONARY TREE

This test is designed to measure your ability to obtain information from evolutionary "family trees".

Set 1

The next five questions refer to the table of information and the family tree set out below.

Approximate Number Of Years Ago	Event
25 000	Modern man in Europe.
40 000	Cro-Magnon man arrives in Europe.
75 000	First record of modern man.
1 000 000	Ancient man existed.
25 000 000	Ancestor of both modern apes and modern man existed.
40 000 000	First monkey-like primates.
60 000 000	First tarsiers.
65 000 000	First lemurs.
70 000 000	First tree shrews.
125 000 000	First mammals.



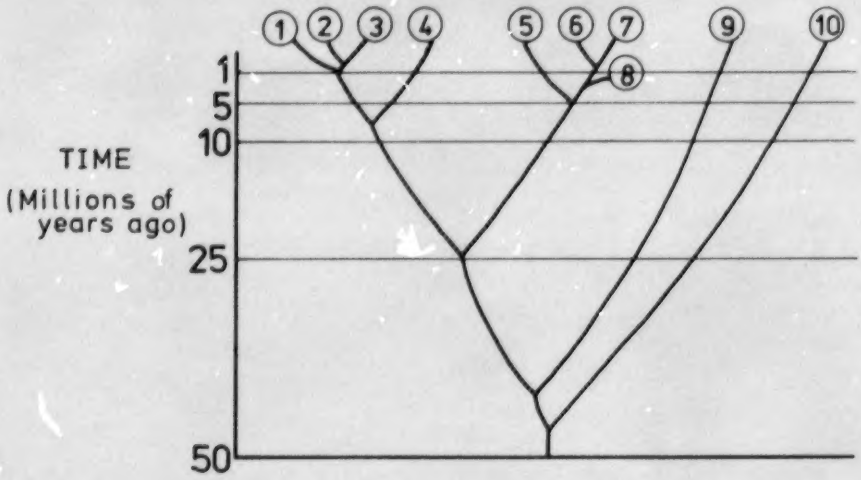
The animals indicated by the numbers 1, 2, 3, 4 and 5 in the "family tree" are mentioned in the table. Choose the animal which best fits each number, and mark its letter (A, B, C or D) on your answer sheet.

ANSWERS					
Q	ANIMAL	A	B	C	D
1	1	Cro-Magnon Man	Monkey	Tarsier	Tree shrew
2	2	Ape	Lemur	Monkey	Tree shrew
3	3	Ancient Man	Lemur	Monkey	Tarsier
4	4	Ancient Man	Lemur	Monkey	Tarsier
5	5	Ancient Man	Ape	Lemur	Monkey

SET 2

M67/2

The next ten questions refer to the "family tree" below. Choose the best answer to each of the questions, and mark its letter (A, B, C or D) on your answer sheet.



Question		ANSWERS			
		A	B	C	D
6.	How many years ago did animal 1 evolve?	50 million	10 million	more than 5 million	less than 1 million
7.	When did animal 2 evolve?	after animal 1	before animal 4	before animal 5	before animal 7
8.	Which animal would animal 3 be most like?	animal 4	animal 5	animal 9	animal 10
9.	Animal 4 shares a common ancestor with	animals 1, 2 & 3 only	animals 9 & 10 only	animals 5, 6, 7 & 8 only	all the animals shown
10.	Which two animals should be most different?	1 & 9	5 & 6	6 & 7	7 & 10
11.	Which animal has evolved most recently	2	5	7	10
12.	Which animal might be found as a fossil 4 million years old?	1	4	6	8
13.	Which animal is the youngest?	4	5	9	10
14.	Which animal is extinct?	3	8	9	10
15.	Which animals evolved more than 6 million years ago?	1, 2 & 3	4, 5, 6 & 8	4, 9 & 10	7, 8, 9 & 10

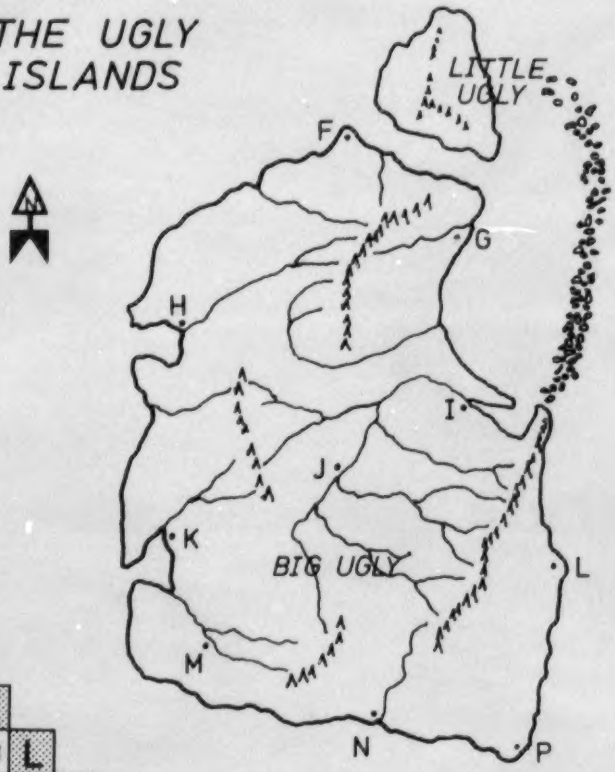
M68

MAPS AND DISTANCES

This test is designed to measure your ability to make calculations from a map and a distance chart.
For each question below choose the correct answer and write its letter (A,B,C or D) on your answer sheet.

The questions refer to the map and distance table below.
The map shows the positions of ten towns (represented by the letters F - P) on the Ugly Islands.
The table shows the straight line distance between towns, measured from "dot" to "dot" to the nearest kilometre. Some distances have been left out.

THE UGLY ISLANDS



SCALE 10km = 1cm

F									
26	G								
44	51	H							
	30	52	I						
58	45	38	25	J					
77	73		56	32	K				
84		78	32	42	68	L			
93	84	57	62	39		63	M		
102	85	77	56	44	48	41	32	N	
112	90	96		59	71	33	58	16	P

DISTANCE TABLE [km]

Set 1: Use the table to determine the distance between the towns.

Q	Towns	Distance between towns (km)			
		A	B	C	D
1.	F and G	24	26	28	30
2.	F and N	98	100	102	104
3.	G and M	84	86	88	90
4.	G and J	40	41	43	45
5.	H and N	72	75	77	79

Set 2: Using the scale on the map, and a ruler, find the shortest distance between each of the towns

Q	Towns	Distance between towns (km)			
		A	B	C	D
6.	F and I	50	52	54	56
7.	G and L	56	58	60	62
8.	H and K	36	38	40	48
9.	I and P	60	64	66	70
10.	K and M	17	18	20	22

Set 3: Which journey is shortest?

Q	Journey	A	B	C	D
11.	F to	G	H	J	K
12.	H to	F	J	L	M
13.	I to	J	K	L	P
14.	L to	H	M	N	P
15.	P to	F	H	K	N

Set 4: If a car made the journeys mentioned, what total distance would it travel?

Q	Journey	Total Distance			
		A	B	C	D
16.	F to G to H	70	77	95	121
17.	F to J to N	90	102	109	143
18.	K to N to P	36	48	64	87
19.	L to K to J to I	106	113	125	184
20.	P to M to H to F	133	134	159	180

M69

GENETIC DOUBLE CROSSES

This test is designed to measure your understanding of genetic crosses using "double characteristic" examples.

For each question select the correct answer and write its letter (A, B, C or D) on your answer sheet.

The questions which follow refer to the following information:

Fowls feet shape, and feather variety, like all other characteristics which are gene controlled, can be represented by letters.

For this test, we shall use the following letters for the gene alleles:

- F = allele for frizzled feathers
- f = allele for normal feathers
- Neither F nor f is dominant.
- The heterozygous fowl (Ff) is described as "slightly frizzled".
- T = allele for turned toes
- t = allele for straight toes
- T is dominant over t.

SET 1: Select the correct possible genotype for each of the fowls described.

Q.	Fowl	Genotype of Fowl			
		A	B	C	D
1.	Frizzled feathered turned toed fowl.	FFTT	FfTT	FfTt	fftt
2.	Slightly frizzled straight toed fowl.	FFTt	FfTT	Fftt	fftt
3.	Normal feathered turned toed fowl.	FFTt	FfTT	ffTt	fftt
4.	Normal feathered straight toed fowl.	FFTT	FfTt	ffTt	fftt
5.	Frizzled straight toed fowl.	FFTt	FfTT	FfTt	FFtt

SET 2: The genotype of a fowl and of one of its parents is given. The alternatives give the genotypes of four other fowls. Which one is NOT a possible parent?

Q.	Genotype of Fowl	Genotype of 1 parent	Genotype of Other Parent			
			A	B	C	D
6.	FFTT	FfTt	FfTt	FFTt	FFTT	Fftt
7.	FfTT	FfTT	FFTT	FfTt	FFtt	FfTT
8.	FfTt	FFtt	fftt	FFTt	ffTt	FfTT
9.	ffTt	FftT	FfTT	fftt	fFTt	FFtt
10.	fftt	FfTt	FfTt	fftt	Fftt	FFtt

M69/2

Set 3: The genotypes of the two parents of a fowl are given. The alternatives give the phenotype of four other fowls. Which one is NOT a possible offspring?

Q	Genotype of Male Parent	Genotype of Female Parent	Offspring			
			A	B	C	D
11.	FFTt	FfTt	Frizzled, straight toed	Slightly frizzled, turned toed	Frizzled, turned toed	Normal feathered, turned toed
12.	fftt	FfTt	Frizzled, straight toed	Normal feathered, straight toed	Normal and turned toed	Slightly frizzled, turned toed
13.	FfTT	Fftt	Frizzled, turned toed	Slightly, frizzled, straight toed	Normal feathered, turned toed	Frizzled, turned toed
14.	FfTt	ffTt	Normal feathered, turned toed	Normal feathered, straight toed	Frizzled, turned toed	Slightly frizzled, straight toed
15.	FfTt	FFTt	Frizzled, turned toed	Normal feathered, turned toed	Slightly frizzled, turned toed	Slightly frizzled, straight toed

Set 4: The genotype of parent fowl are given for each pair of parents, determine the theoretical ratio for the characteristics indicated, in the offspring of these parents.

Q	Parent 1	Parent 2	Ratio Required in Offspring	Value of Ratio			
				A	B	C	D
16.	FFTT	FfTt	Frizzled fowls to slightly frizzled fowls	1:1	1:2	2:1	3:1
17.	FfTt	FfTt	Frizzled fowls to slightly frizzled fowls	1:1	1:2	2:1	3:1
18.	FFTt	FfTt	Frizzled turned toed to frizzled straight toed fowl	1:1	1:2	2:1	3:1
19.	FfTt	FfTt	Slightly frizzled fowl to straight toed fowl	1:1	1:2	2:1	3:1
20.	FfTt	FfTt	Frizzled turned toed fowl to frizzled straight toed fowl	1:1	1:2	2:1	3:1

CONSERVATION OF ENERGY

M70

This test is designed to measure your ability to apply the law of conservation of energy.

For each question choose the correct answer and write its letter (A, B, C or D) on your answer sheet.

You may need this information to answer the questions:

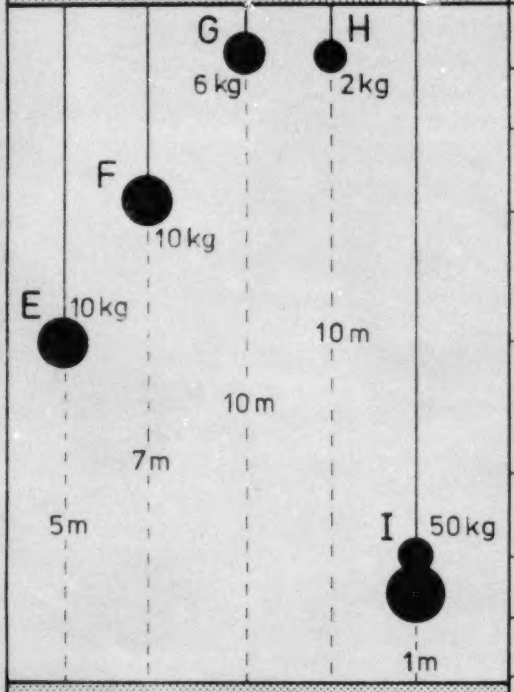
(a) Kinetic energy, K.E. = $\frac{1}{2}mv^2$

(b) Potential energy, P.E. = mgh

(c) Work done, W = value of the change in energy

(d) The value of the acceleration due to gravity, g = $10 m/s^2$

Set 1: Consider the objects shown in diagram 1. Each object is suspended from the roof of a room. The mass of each object is indicated. The height of each object above the floor is also shown.

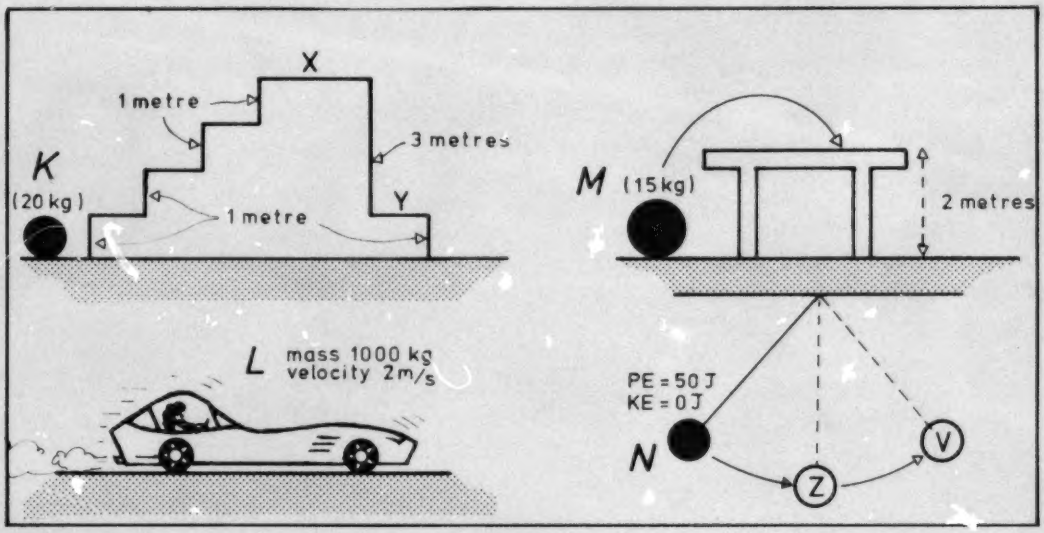


All heights measured to the centre of mass of each object.

Diagrams not to scale.

Q	Which object ...	A	B	C	D
1.	Has the most potential energy?	E	F	G	I
2.	Has 600J of potential energy?	F	G	H	I
3.	Has the same potential energy as object E?	F	G	H	I
4.	Would have 200J of kinetic energy if its string broke and it fell to the floor?	E	F	G	H
5.	Would have the most K.E. if all strings broke and the objects fell to the floor?	E	F	G	H
6.	Would do most work in falling to the floor?	E	F	G	I
7.	Would do 700J of work in falling?	F	G	H	I
8.	Would do least work in falling?	E	F	H	I
9.	Required 600J of work to life it into its present position?	E	F	G	I
10.	Requires the same amount of work to lift it into position as object E?	F	G	H	I

Set 2: The next 10 questions refer to the diagrams below. Various measurements are shown on each diagram.



Q		ENERGY OR WORK IN JOULES			
		A	B	C	D
11.	If object K fell from X to Y, how much K.E. would it gain?	100	200	600	800
12.	What would be the P.E. of object N at Z?	0	25	50	100
13.	How much K.E. would object N have at Z?	0	25	50	100
14.	How much P.E. would object K have at X?	160	240	600	800
15.	What would be the K.E. of object M if it fell off the table onto the floor?	0	150	300	450
16.	How much work is needed to lift object K to position X?	24	200	400	800
17.	How much work is needed to lift object M onto the table?	15	30	150	300
18.	How much work is needed to stop car L?	1002	2000	4000	8000
19.	How much work would object N do in moving from Z to V?	25	50	100	200
20.	If object K fell from Y to the floor, how much work would it do in falling?	120	200	300	400

MOMENTUM

This test is designed to measure your ability to apply the momentum equation to theoretical situations.

For each question choose the correct answer and mark its letter (A,B,C or D) on your answer sheet).

You may need the following information to answer the questions.

$P = mv$ where: P = momentum in kg.m/s
m = mass in kg
v = velocity in m/s

Set 1: The table gives the masses and velocities of several objects. Calculate the momentum of each.

Q	Mass of object (kg)	Velocity (m/s)	Momentum (kg.m/s)			
			A	B	C	D
1.	0.5	4	0.9	2	9	20
2.	1.0	8	8	9	10	80
3.	2.0	0.25	0.5	1	5.0	50
4.	5.0	2	1.0	2.5	7.0	10
5.	10.0	6	1.66	10	16	60

Set 2: The table shows the masses and momentums of several objects. Calculate the velocity of each object.

Q	Mass of object (kg)	Momentum (kg.m/s)	Velocity(m/s)			
			A	B	C	D
6.	1	16	1/16	15	16	17
7.	2.5	20	0.1	8	10	12
8.	5	15	3	5	10	20
9.	10	5	0.5	2	15	50
10.	300	6000	0.5	0.5	2	20

Set 3: The table gives the momentum and velocities of several objects. Find the mass of each object.

Q	Momentum (kg.m/s)	Velocity (m/s)	Mass (kg)			
			A	B	C	D
11.	0.25	2	0.05	0.125	0.5	2.25
12.	0.5	5	0	0.01	0.1	0.5
13.	2.0	3	0.66	1.5	1.7	6.0
14.	27	9	0.33	3	20	36
15.	150	30	0.2	5	120	180

Set 4: Determine the correct magnitude of each of the quantities, E, F, G, H and I.

Q	Momentum (kg.m/s)	Mass (kg)	Velocity (m/s)	A	B	C	D
16.	60	15	E	0.1	0.25	3	4
17.	F	6	3	2	3	9	18
18.	0.5	G	10	0.05	2	5	20
19.	5	2	H	0.4	2.5	3	7
20.	I	10	2.5	0.25	4	12.5	25

Set 5: This set is designed to identify problems which you may have shown in the first four sets. In each question, use the equation given for that question to find the correct answer, and mark its letter (A,B,C orD) on your answer sheet.

Q	Given Equation	Find	Answers			
			A	B	C	D
21.	$y = 3x$	x	3y	y	$\frac{y}{3}$	y^3
22.	$x = \frac{y}{z}$	y	xz	xy	$\frac{x}{z}$	$\frac{z}{x}$
23.	$x = \frac{y}{z}$	z	xy	$\frac{x}{y}$	$\frac{y}{x}$	x+y
24.	$y = xz$	x	yz	y+z	$\frac{y}{z}$	$\frac{z}{y}$
25.	$y = xz$	z	xy	x+y	$\frac{x}{y}$	$\frac{y}{x}$

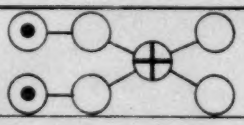
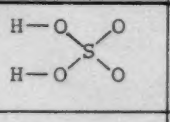
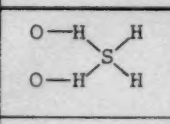
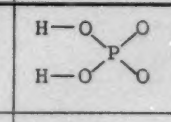
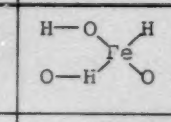
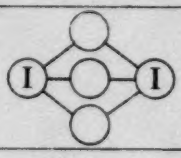
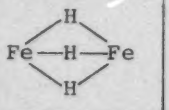
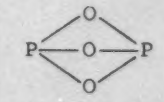
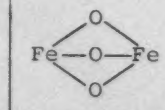
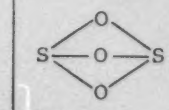
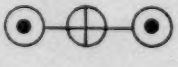
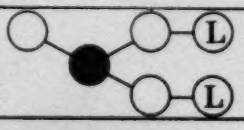
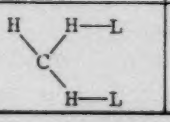
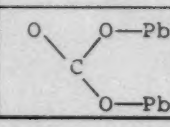
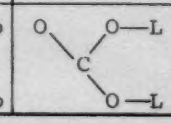
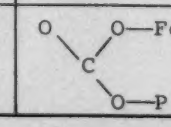
M72

CHEMICAL FORMULAE – CODES

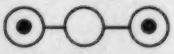
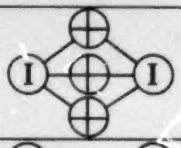
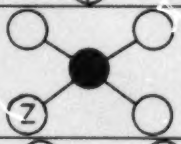
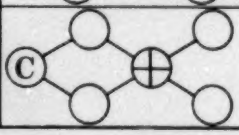
This test is designed to measure your ability to use codes.
Choose the correct answer for each question below and marks its letter (A,B,C or D) on your answer sheet.
Use the following information to answer the questions.

Name of Element	Modern Symbol	Dalton's Symbol
Hydrogen	H	
Carbon	C	
Oxygen	O	
Phosphorus	P	
Sulphur	S	
Iron	Fe	
Zinc	Zn	
Copper	Cu	
Lead	Pb	
Silver	Ag	

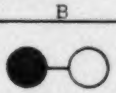
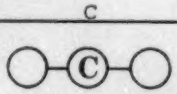
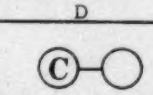
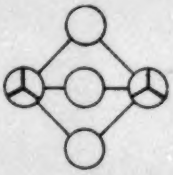
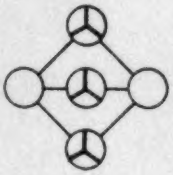
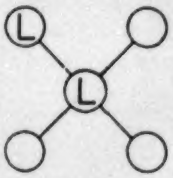
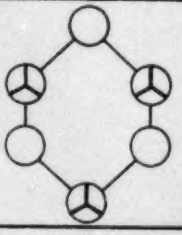
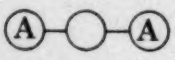
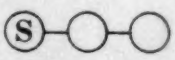
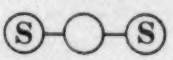
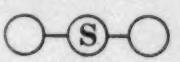
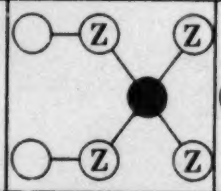
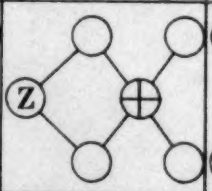
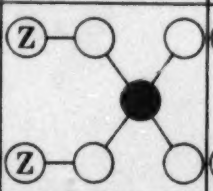
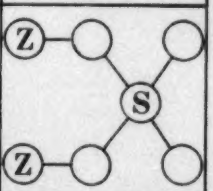
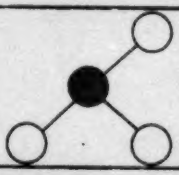
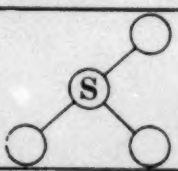
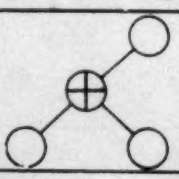
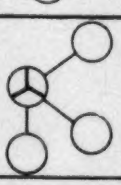
Set 1: Questions 1-5 show a Dalton Model compound. What is the modern version of these compounds?

Q	Dalton Model	Modern Model A	B	C	D
1					
2		Zn—C	Cu—O	Zn—O	Ag—O
3					
4		H—O—H	O—C—O	H—P—H	H—S—H
5					

Set 2: Which modern chemical formula below best represents the Dalton model given?

Question	Dalton Model	Modern Formula			
		A	B	C	D
6.		HCl	CO_2	CO	H_2O
7.		CO_2	H_2O	H_2S	H_2O_2
8.		Fe_2S_3	Fe_2O_3	Fe_3S_2	Fe_2P_3
9.		ZCO_3	$ZnCO_3$	$ZnSO_3$	$ZnSO_4$
10.		CPO_4	$AgCO_4$	$CuPO_4$	$CuSO_4$

Set 3: Which Dalton model best represents the modern formula indicated?

Q	Modern Formula	Dalton Formula			
		A	B	C	D
11	CuO				
12	P_2O_3				
13	Ag_2O				
14	$ZnSO_4$				
15	SO_3				

M73

POTENTIAL ENERGY

This test is designed to measure your ability to calculate the potential energy of an object given the equation:

$PE = mgh$ where PE = Potential energy in Joules (J)
m = mass in kilograms
h = height in metres
the value of the acceleration due to gravity, g = 10 m/s^2

For each question below, choose the correct answer and write its letter (A,B,C or D) on your answer sheet.

Set 1: The next 5 questions refer to this diagram which shows the masses of 5 different objects, and their height above the ground.

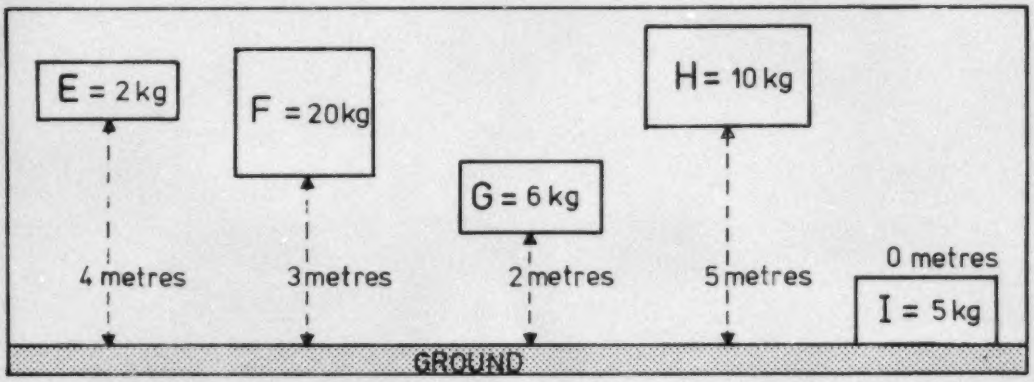
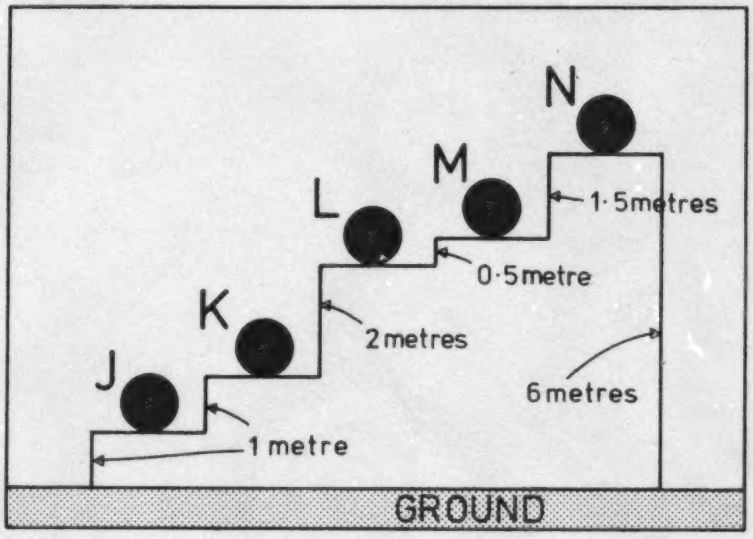


Diagram and heights not to scale.

Q	Statement	A	B	C	D
1.	Which object has the most potential energy?	E	F	G	H
2.	Which object has potential energy equal to 120J?	E	F	G	H
3.	Which object has five times as much P.E. as object G?	E	F	H	J
4.	Object F has more P.E. than object I. How much more?	18J	60J	130J	600J
5.	If object E was on the ground, how much P.E. would it have?	OJ	6J	26J	80J

Set 2: Calculate the value of the potential energy for each of the objects J, K, L, M and N as shown in the diagram. Each object has a mass of 20 kg.



Q	Object	P.E. in Joules			
		A	B	C	D
6.	J	20	21	200	221
7.	K	10	32	200	400
8.	L	400	800	900	1000
9.	M	450	805	900	950
10.	N	180	300	600	1200

Set 3: Calculate the value of the unknown quantities, P, Q, R, S and T using the information given in the table.

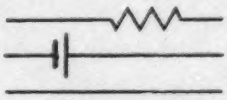
Q	Mass of object (kg)	Height above ground (m)	PE of the object (J)	Value of Unknown Quantity			
				A	B	C	D
11.	1	2	P	5	13	20	201
12.	2	Q	80	4	8	20	68
13.	R	6	180	3	18	30	154
14.	4	S	160	4	40	640	1600
15.	5	2	T	17	20	52	100

M74

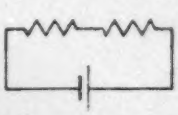
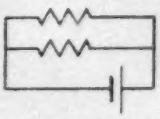
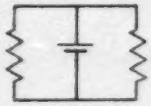
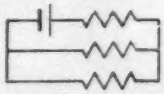
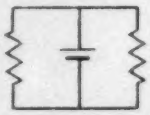
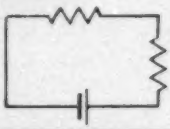
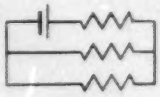
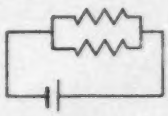
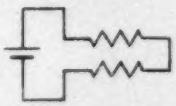
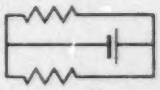
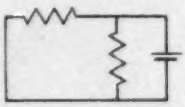
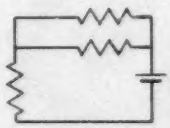
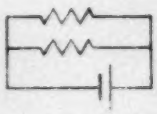
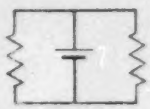
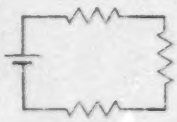
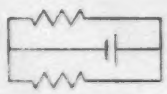
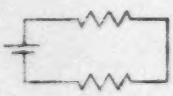
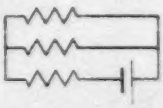
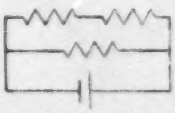
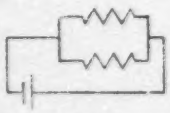
PARALLEL AND SERIES RESISTORS

This test is designed to measure your ability to recognise series and parallel resistance in circuit diagrams.

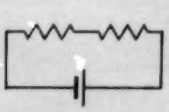
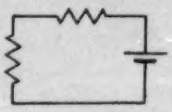
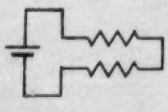
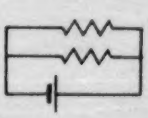
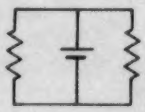
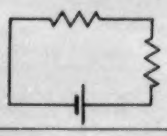
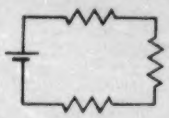
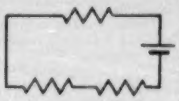
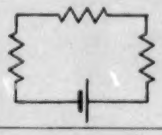
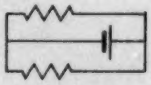
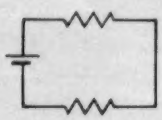
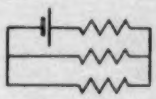
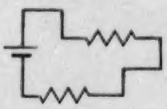
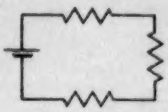
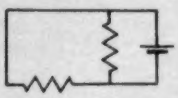
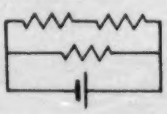
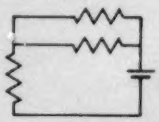
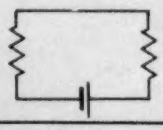
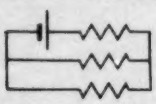
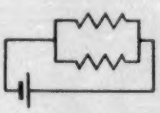
Use the key to identify the circuit components



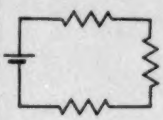
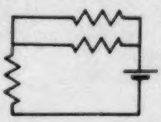
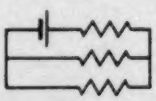
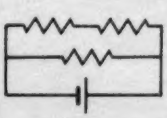
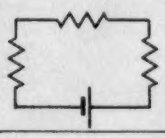
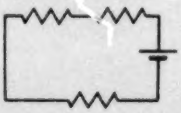
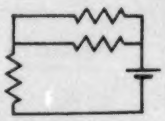
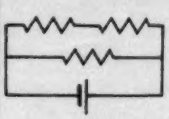
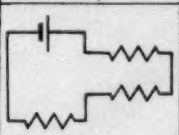
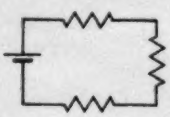
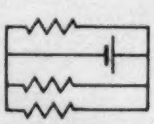
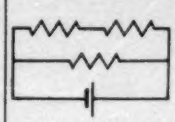
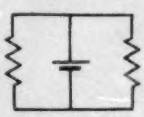
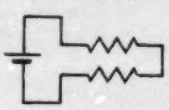
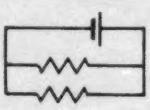
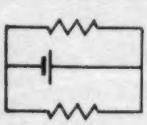
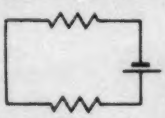
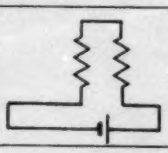
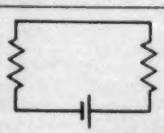
SET 1: Choose the circuit which contains ONLY resistors in *series* and mark its letter (A,B,C or D) on your answer sheet.

Q	POSSIBLE ANSWERS			
	A	B	C	D
1				
2				
3				
4				
5				

SET 2: Choose the circuit which contains ONLY resistors in *parallel*

Q	POSSIBLE ANSWERS			
	A	B	C	D
6				
7				
8				
9				
10				

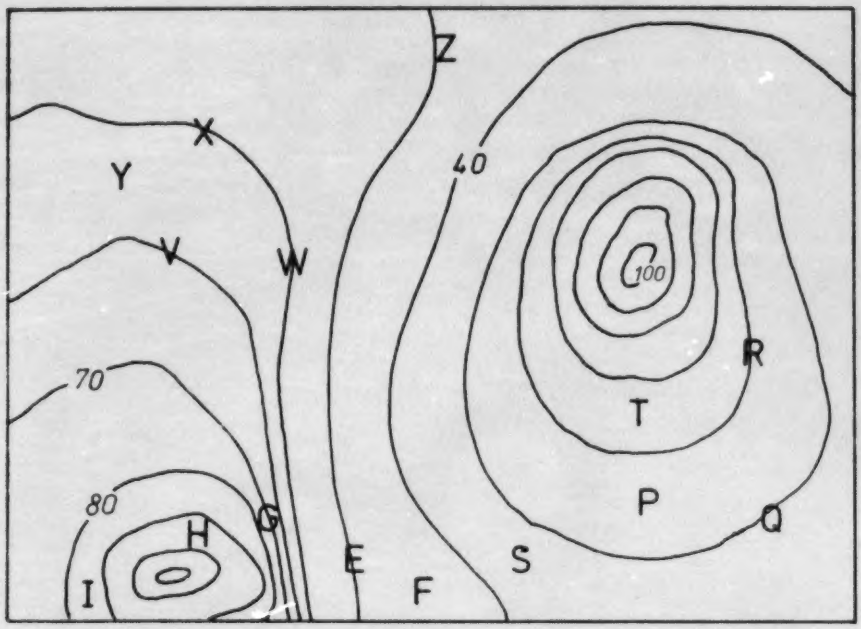
Set 3: Choose the *circuit* which best matches the description given

DESCRIPTION OF CIRCUIT	POSSIBLE ANSWERS			
	A	B	C	D
11 Circuit contains three resistors in series				
12 Contains one resistor in series with two parallel resistors				
13 Contains one resistor in parallel with two others these being connected in series				
14 Contains two resistors only, in series				
15 Contains two resistors only, in parallel				

INTERPRETING A CONTOUR MAP

This test is designed to test your ability to interpret a contour map. For each question choose the correct answer and write its letter (A, B, C or D) on your answer sheet.

Use the contour map below to answer the questions which follow it.



Set 1: What is the height above sea level of the following points?

Q	Point	A	B	C	D
1.	E	20	30	40	50
2.	F	30	35	45	50
3.	H	80	85	95	100
4.	Q	50	60	70	75
5.	R	20	60	120	140

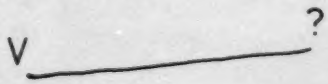
Set 2:

Q	Question Which of the following points is	Alternative			
		A	B	C	D
6.	the highest point.	H	I	R	T
7.	the lowest point.	P	Q	R	S
8.	same height as point X	G	E	Q	R
9.	same height as point Y	H	I	P	S
10.	lower than point Z	E	F	H	I

SET 3:

Q	Question	Alternatives			
		A	B	C	D
11.	Which point is situated on the steepest incline?	E	F	G	H
12.	At which point would you be most likely to find a river?	E	F	S	Y
13.	Which point is on land which is sloping *least*?	F	H	R	X
14.	Flattest land would be found between X and ...	V	W	Y	Z
15.	Which point is closest to the top of a hill?	E	H	P	Z

Set 4: The next five questions show part of the surface of the land between two points on the map.
One point is named and the other is called "?". Study the map and determine which point on the map is point "?" for each question.
(approximate vertical scale .5 cm = 10 contour units)

Q	SHAPE OF LAND FORM:-	POINT "?" IS			
		A	B	C	D
16		E	F	S	W
17		I	P	Q	S
18		G	H	I	Z
19		S	T	X	Z
20		E	G	Q	R

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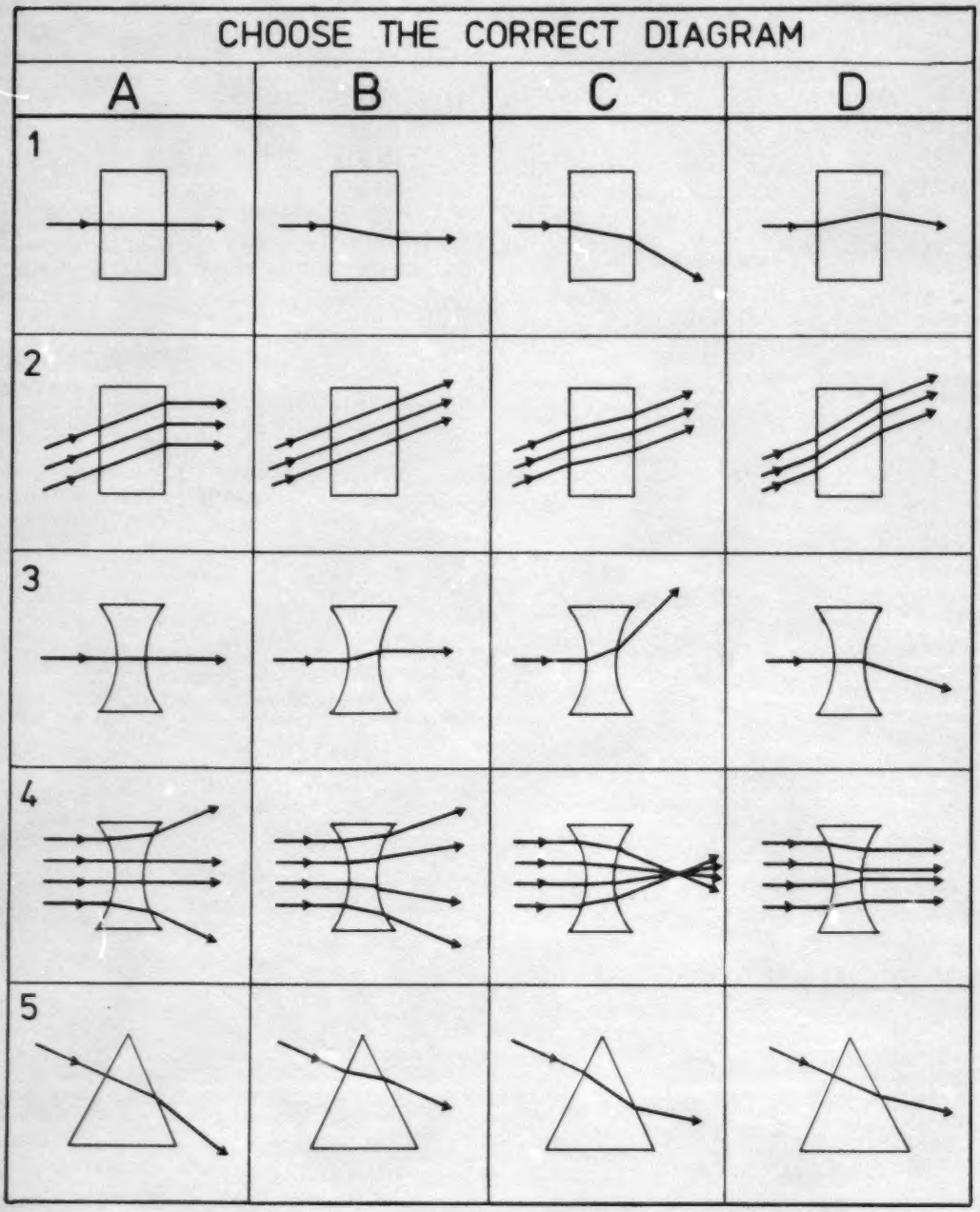
PATHS OF REFRACTED RAYS

This test is designed to measure your ability to correctly predict the paths taken by rays of light as they pass through glass objects.

Choose the diagram which shows the correct paths of the rays of light through the object given. Mark its letter (A, B, C or D) on your answer sheet.



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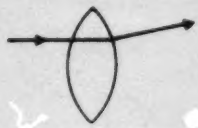
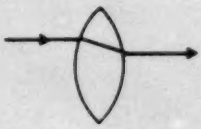
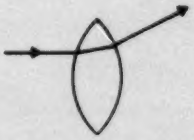
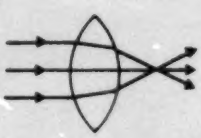
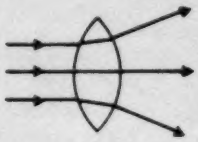
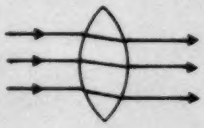
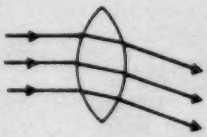
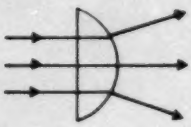
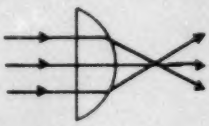
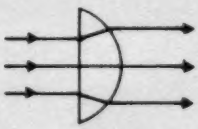
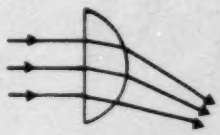
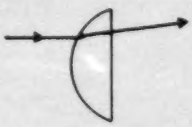
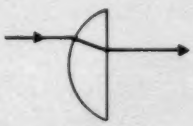
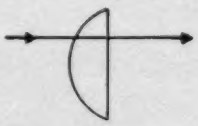
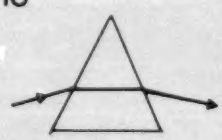
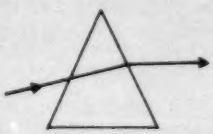
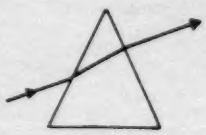
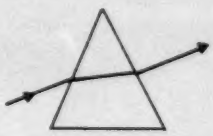
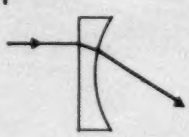
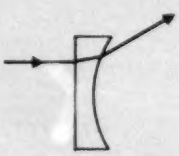
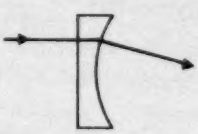
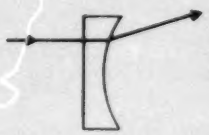
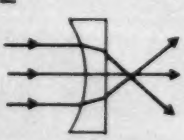
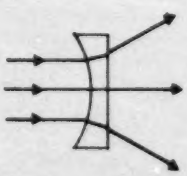
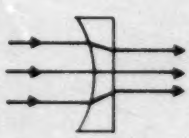
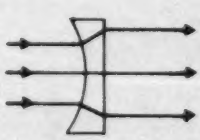
CHOOSE THE CORRECT DIAGRAM

	A	B	C	D
6				
7				
8				
9				
10				
11				
12				

48

OHM'S LAW-SINGLE RESISTANCES

This test is designed to measure your ability to apply Ohn's law to single resistance circuits.

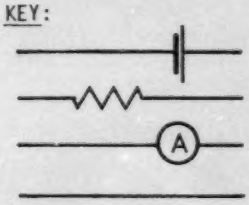
For each question choose the correct answer and write its letter (A,B,C or D) on your answer sheet.

You may need the following information to answer the questions:

a. The equation for Ohm's Law is V = IR

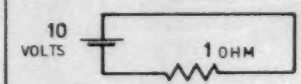
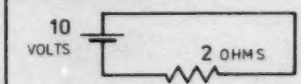
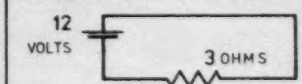
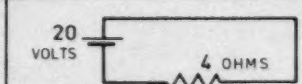
where V = potential difference in volts
I = current in amps
R = resistance in ohms

b. KEY:

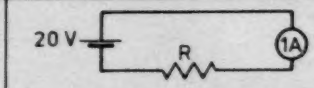
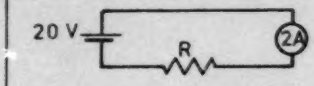
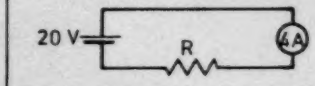
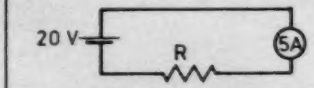
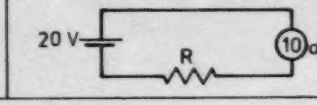


dry cell
resistor
ammeter
wire

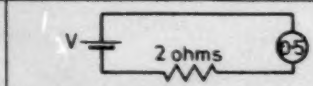
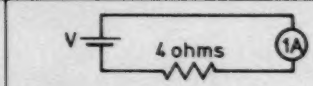
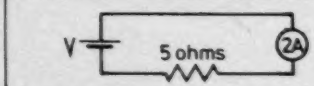
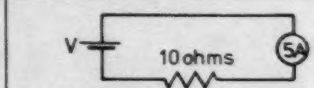
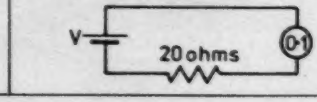
SET 1: What is the current flowing in each of the circuits shown in questions 1 to 5?

Q	CIRCUIT	CURRENT FLOWING (amps)			
		A	B	C	D
1		0.1	9	10	11
2		0.2	5	8	12
3		0.25	4	9	15
4		0.2	5	16	80
5		0.05	20	105	500

Set 2: What is the value of the resistor, R, in each of the circuits? Each ammeter shows the current flowing in the circuit.

Q	CIRCUIT	RESISTANCE (Ohms)			
		A	B	C	D
6		1/20	1	19	20
7		2	10	18	40
8		4	5	24	80
9		4	15	25	100
10		2	10	30	200

Set 3: What is the value of the potential difference, V, in each of the circuits? Each ammeter shows the current flowing in the circuit.

Q	CIRCUIT	POTENTIAL DIFFERENCE (volts)			
		A	B	C	D
11		0·5	1	1·5	2·5
12		1	3	4	5
13		2	3	7	10
14		2	5	15	50
15		2	10	20	21

USING $a = \frac{dv}{dt}$

This test is designed to measure your ability to use the equation for uniform acceleration.

You may need the following information to answer the questions below

$a = \frac{\Delta v}{\Delta t}$ where: a = acceleration in ms^{-1}

Δv = change in velocity in ms^{-1}

Δt = change in time in s

NOTE- Some students may be more familiar with this equation written as:

$$a = \frac{dv}{dt}$$

Set 1

In questions 1-5 determine the uniform acceleration in each situation, given the change in velocity which has occurred, and the time taken for this change to occur.

Q	Change in velocity ms^{-1}	Change in time (s)	Acceleration ms^{-2}			
			A	B	C	D
1.	6	3	0.5	2	9	18
2.	12	4	3	4	8	16
3.	20	5	0.25	0.4	4	25
4.	30	6	5	6	24	36
5.	48	12	0.25	4	8	16

Set 2

In questions 6-10, determine the velocity change which would occur if the acceleration indicated acted for the times given.

Q	Acceleration ms^{-2}	Time acceleration acts (s)	Velocity Change ms^{-1}			
			A	B	C	D
6.	2	2	0	1	2	4
7.	3	2	1	5	6	9
8.	4	3	0.75	1.3	7	12
9.	5	10	15	50	100	125
10.	10	10	1	10	20	100

Set 3

For each question 11-15, select the time each acceleration would have to act to produce the velocity changes indicated.

Q	Acceleration ms^{-2}	Velocity Change ms^{-1}	Time (s)			
			A	B	C	D
11.	2	10	5	8	12	20
12.	3	15	0.2	5	12	45
13.	1	25	0.05	24	25	26
14.	5	5	0	1	10	25
15.	6	36	3	6	30	42

Set 4

In questions 16-20 select the correct value for each of the quantities P, Q, R, S & T.

Q	Acceleration ms^{-2}	Time (s)	Change in Velocity ms^{-1}	A	B	C	D
16.	1	2	P	0.5	1	2	3
17.	Q	2	4	1	2	5	6
18.	3	R	12	4	8	9	15
19.	0.5	4	S	0.125	2	3.5	8
20.	0.1	T	20	0.05	2	100	200

SELECTING SI UNITS

This test is designed to test your ability to compute the units of a quantity from an equation for the quantity, and vice versa. For each question choose the correct answer and write its letter (A, B, C or D) on your answer sheet.

Use the following information to answer the questions:

QUANTITY	SYMBOL	UNIT OF QUANTITY	SYMBOL FOR UNIT
Mass	M	kilogram	kg
Time	t	second	s
Acceleration	a	metres per second^2	ms^{-2}
Distance	d	metre	m
Velocity	v	metre per second	ms^{-1}
Force	F	Newtons	$N = kgms^{-2}$

Set 1

For each question given, select the unit which applies to the subject of the equation, P,Q,R,S or T.

Q.	Equation	Unit A	Unit B	Unit C	Unit D
1.	P = Ma	$kg.ms^{-2}$	$kg.ms^2$	$kgm^{-1}s^{-2}$	ms^2kg^{-1}
2.	Q = at	ms	ms^{-1}	ms^{-2}	sm^{-1}
3.	R = Mv	kg/ms	$kg.sm^{-1}$	$kg.ms^{-1}$	$kg.sm^{-1}$
4.	S = vd	m^2s^2	ms^{-1}	sm^{-2}	m^2s^{-1}
5.	$T = at^2$	ms/s^2	m	m^2s^2	m^2s^{-2}

Set 2

Which quantity would have the units given.

Q.	Units	Quantity A	Quantity B	Quantity C	Quantity D
6.	$kg.ms^{-1}$	Mat	Mvd	vat	$\frac{Ma}{t}$
7.	m^2s^{-1}	$\frac{d}{t^2}$	$\frac{a}{t} + d$	$\frac{d^2}{t}$	$\frac{a}{t^2}$
8.	$kg.s^2$	Mv^2t	$\frac{d}{t^2}$	$\frac{1}{2}Mv^2$	Mt^2
9.	mkg^{-1}	Mv	$\frac{v}{Mt}$	$\frac{Mv}{d}$	$\frac{d}{M}$
10.	$kg.m^2$	$\frac{Mv}{s}$	Md^2	$\frac{Ma}{d}$	Mva

Set 3

Which quantity would have the same units as the subject of the equation, G, H, I, J, or K?

Q.	Equation	Quantity A	Quantity B	Quantity C	Quantity D
11.	$G = vt$	d	vat	vd	av
12.	$H = Mv$	aF	Mt	Ft	vd
13.	$I = Mv^2$	Ft	Fd	$\frac{F}{d}$	Mat
14.	$J = at$	F	vt^2	dt	v
15.	$K = Fd$	Mad	Mv	at	Ma

M80

MEASURING LENGTH

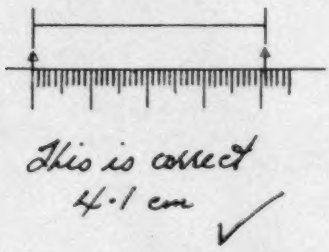
NOTE: Students will require a metric rule to complete this test.

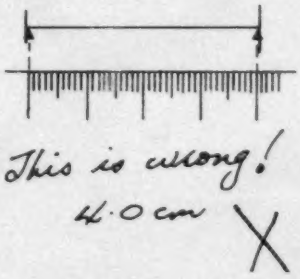
This test is designed to measure your ability to use a metric rule to measure length.

For each question, choose the correct answer and write its letter (A, B, C or D) on your answer sheet.

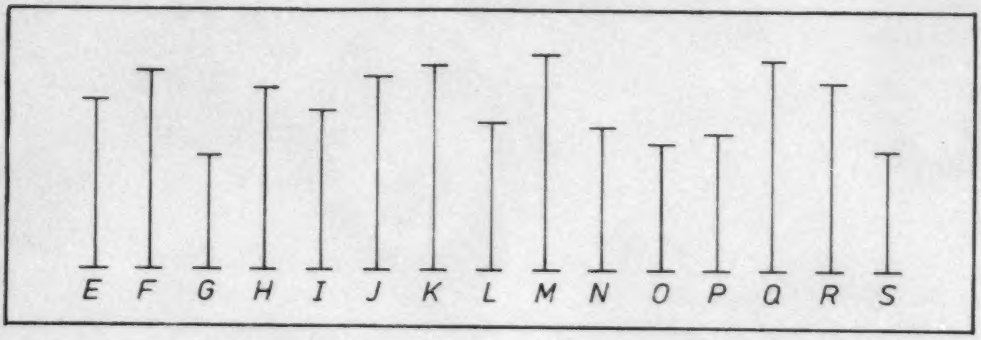
The questions below refer to these diagrams. The diagrams show various lines, labelled E - S. You will be required to measure the height of the lines to the nearest millimetre. Measure all lines from one end bar to the next.

Example





Use these diagrams to answer the questions:



Set 1: What is the height of each line indicated, in centimetres?

Q	Line	Height in Centimetres			
		A	B	C	D
1.	F	3.4	3.5	3.6	3.7
2.	H	3.0	3.1	3.2	3.3
3.	J	3.1	3.2	3.3	3.4
4.	L	2.4	2.5	2.6	2.7
5.	N	2.5	2.6	2.7	2.8

Set 2: What is the height of the line indicated, in millimetres?

Q	Line	Height in millimetres			
		A	B	C	D
6.	P	22	23	24	25
7.	S	21	22	23	24
8.	G	19	20	21	22
9.	K	33	34	35	36
10.	M	36	37	38	39

Set 3: Which line is the height indicated by each question?

Q	Height of Line	Line			
		A	B	C	D
11.	33mm	F	H	J	R
12.	28mm	E	I	N	P
13.	25mm	G	L	N	S
14.	37mm	F	M	Q	R
15.	20mm	G	L	O	S

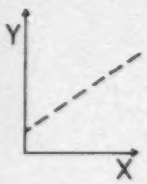
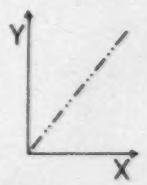
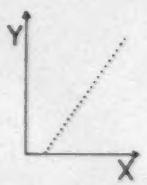
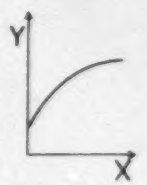
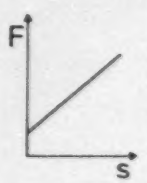
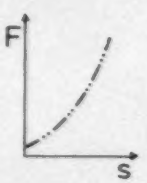
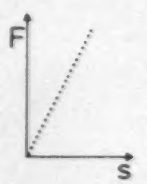
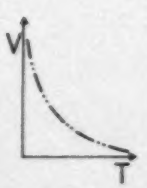
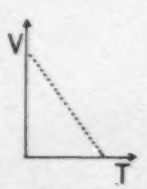
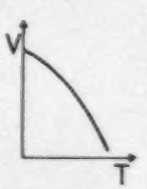
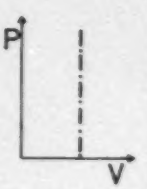
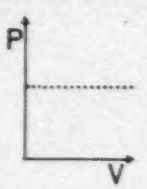
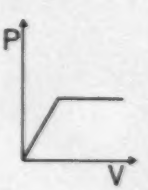
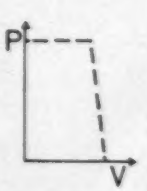
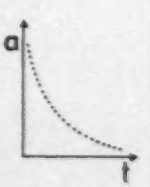
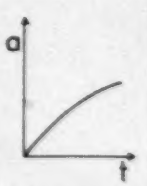
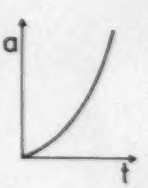
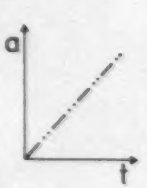
Set 4: Which line is the height indicated by each question?

Q	Height of Line	Line			
		A	B	C	D
16.	3.0cm	E	H	J	L
17.	2.8cm	I	M	Q	R
18.	2.2cm	G	L	O	S
19.	3.7cm	F	J	M	Q
20.	2.1cm	G	L	O	S

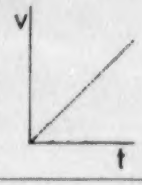
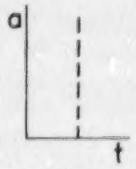
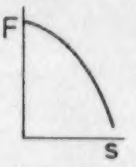
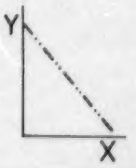
MATCHING GRAPHS AND DATA

This test is designed to measure your ability to match data to graphs. For each question below, choose the graph which best plots that data with the letter (A,B,C or D) on your answer sheet.

SET 1: Choose the graph below which best plots each of the sets of data and mark its letter (A,B,C or D) on your answer sheet. For each question assume that the scale on each axis of any particular graph is the same.

Q	DATA	A	B	C	D
1	Y: 0, 1, 2, 3 / X: 1, 2, 3, 4				
2	F: 2, 4, 6, 8 / s: 1, 2, 3, 4				
3	V: 10, 8, 6, 4 / T: 0, 1, 2, 3				
4	P: 0, 1, 2, 3 / V: 5, 5, 5, 5				
5	a: 0, 1, 2, 3 / t: 0, 1, 4, 9				

SET 2: Choose the set of data which best represents the graph, and mark the letter (A,B,C or D) on your answer sheet. For each question assume that the scale on each axis of any particular graph is the same.

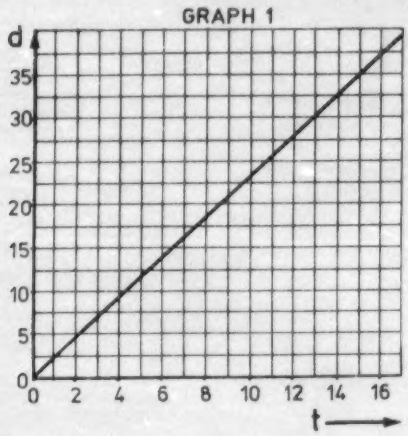
Q	GRAPH	A	B	C	D
6		v t 5 4 4 3 3 2 2 1	v t 0 0 2 4 3 9 4 16	v t 0 0 2 2 4 4 6 6	v t 0 1 1 3 2 5 3 7
7		a t 5 2 5 4 5 6 5 8	a t 0 1 2 4 3 6 4 9	a t 2 1 3 2 4 3 5 4	a t 2 10 4 10 6 10 8 10
8		P V 8 4 4 8 2 12 1 16	P V 2 1 4 2 6 3 8 4	P V 5 1 5 2 7 3 7 4	P V 15 1 10 2 5 3 0 4
9		F s 10 1 8 2 6 3 4 4	F s 20 0 15 8 10 12 5 14	F s 2 1 4 2 6 3 8 4	F s 2 1 9 2 16 3 25 4
10		Y X 15 4 10 8 5 12 0 16	Y X 0 0 2 2 4 4 6 6	Y X 0 2 1 4 2 6 3 8	Y X 10 1 7 2 5 3 4 4

READING A GRAPH BY INTERPOLATION

You may need a set square and a ruler to answer this test. This test is designed to measure your ability to get information from graphs. In each set, look at the graph, choose the most correct answer and mark its letter (A,B, C or D) on your answer sheet.

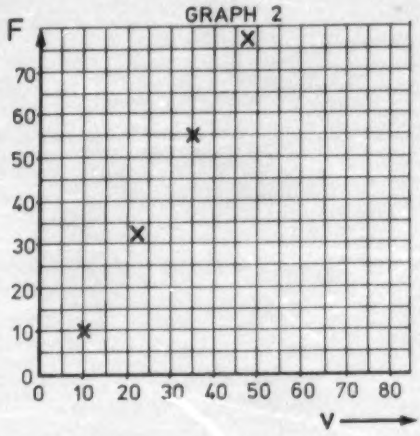
Set 1:

Refers to this graph



Set 2:

Refers to this graph



SET 1: Use graph 1 to answer this set.

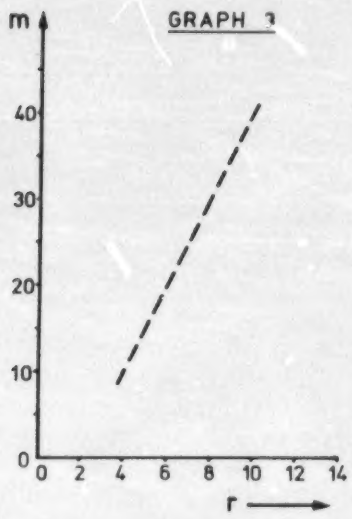
Ques.	Statement	A	B	C	D
1.	When t is 2, d is	0	2	5	10
2.	When t is 10, d is	10	20	23	30
3.	When t is 15, d is	15	25	30	35
4.	When d is 10, t is	4	6	8	10
5.	When d is 27.5, t is	6	12	16	27.5

SET 2: Use graph 2 to answer this set.

Ques.	Statement	A	B	C	D
6.	When v is 12.5, F is	8	10	12.5	15
7.	When v is 27.5, F is	27.5	35	42.5	50
8.	When v is 15, F is	15	17.5	20	25
9.	When F is 45, v is	27.5	30	32.5	35
10.	When F is 10, v is	10	5	15	20

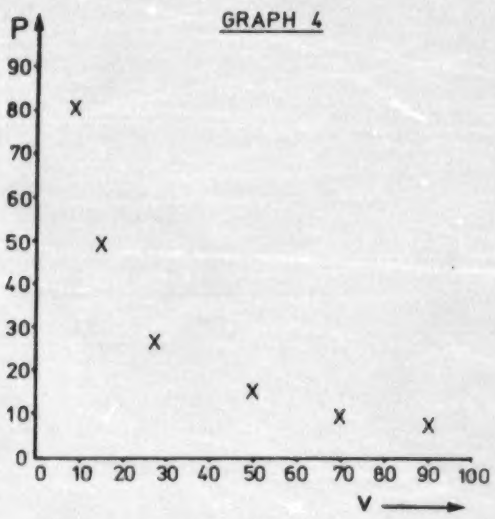
Set 3:

Refers to this graph



Set 4:

Refers to this graph



SET 3: Use graph 3 to answer this set.

Ques.	Statement	A	B	C	D
11.	When r is 5, m is	0	5	10	15
12.	When r is 8, m is	10	20	30	40
13.	When r is 10, m is	30	40	50	60
14.	When m is 10, r is	0	2	4	6
15.	When m is 20, r is	6	8	10	12

SET 4: Use graph 4 to answer this set.

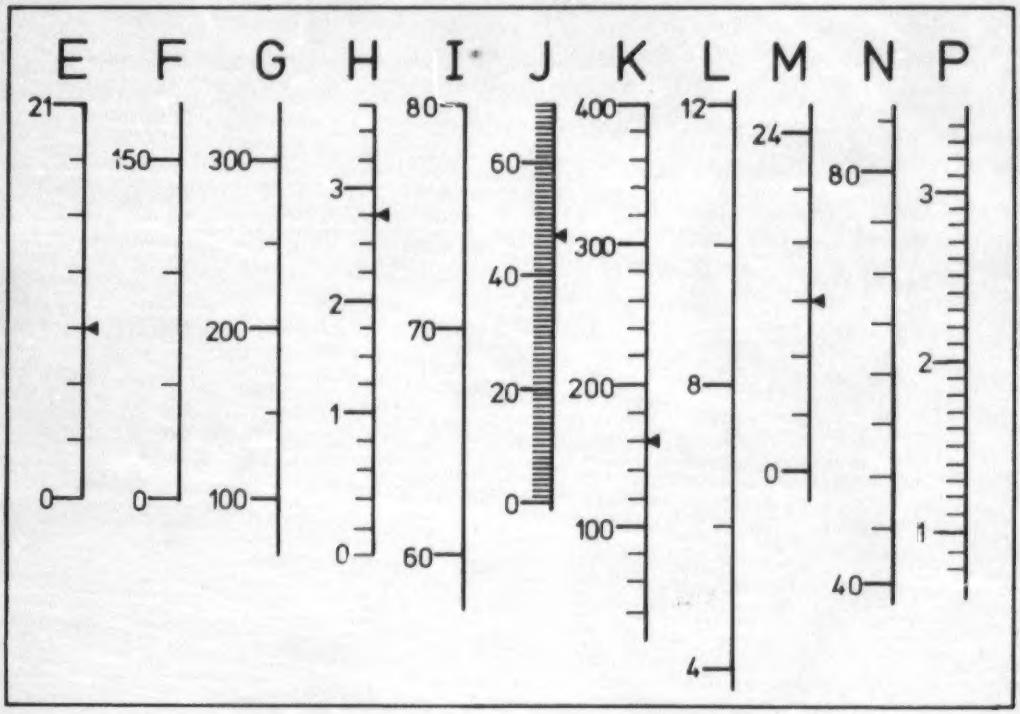
Ques.	Statement	A	B	C	D
16.	When P is 80, v is nearest to	0	10	20	50
17.	When P is 20, v is nearest to	20	40	60	80
18.	When v is 15, P is nearest to	20	30	40	50
19.	When v is 60, P is nearest to	8	12	16	20
20.	When v is 80, P is nearest to	6	8	10	12

SCALE DIVISIONS

This test is designed to measure your ability to identify scale divisions on rulers.

For each question choose the correct answer and write its letter (A, B, C or D) on your answer sheet.

The questions which follow refer to the diagrams below. Each diagram represents a section of a ruler. Each ruler has different scale divisions as shown.



Set 1: On which ruler does each scale division (i.e. the value between two adjacent scale marks) equal the value given?

Q	Value of Scale Division	Ruler			
		A	B	C	D
1.	1 unit	H	J	L	P
2.	2 units	E	H	L	M
3.	3 units	E	H	K	N
4.	4 units	H	J	L	M
5.	5 units	F	G	I	N

Set 2: Which ruler has the scale division (i.e. value between two adjacent scale marks) of the value given?

Q	Value of Scale Division	Ruler			
		A	B	C	D
6.	50 units	F	J	K	N
7.	20 units	E	G	J	K
8.	10 units	I	K	N	P
9.	0.25 units	E	H	J	M
10.	0.1 units	H	J	L	P

Set 3: What is the scale division on each of the rulers given?

Q	Rule	Scale Division			
		A	B	C	D
11.	G	20	50	100	150
12.	J	0.05	0.1	1	20
13.	L	2	4	8	12
14.	M	2	3	4	24
15.	P	0.1	1	2	3

Set 4: Some of the rulers have arrow heads on them. What is the reading to which each arrow head is pointing?

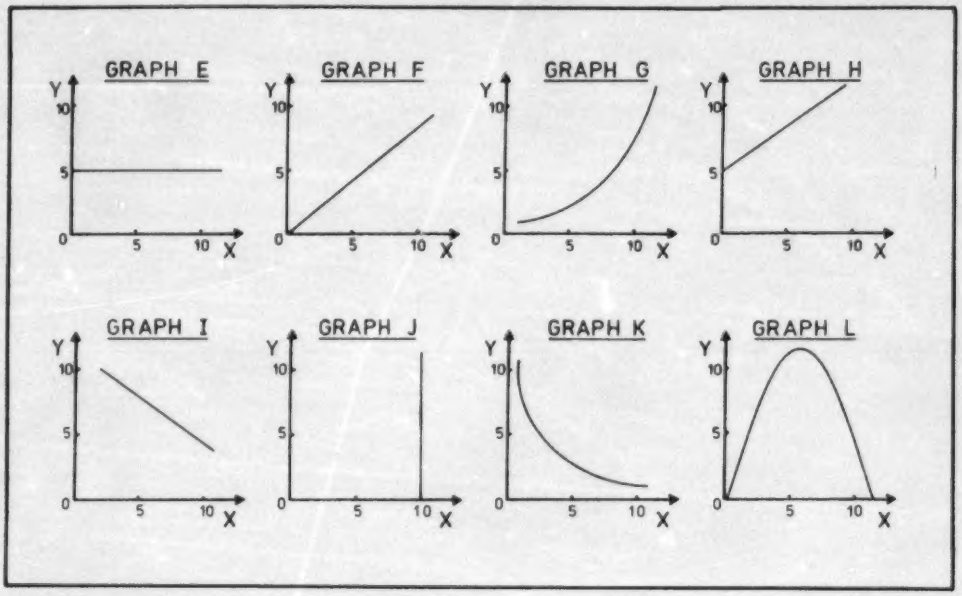
Q	Arrow head on Rule	Reading			
		A	B	C	D
16.	E	3	6	9	15
17.	H	2.3	2.6	2.75	2.8
18.	J	47	48	50	54
19.	K	130	140	150	160
20.	M	3	6	9	12

M84

SHAPES OF GRAPHS

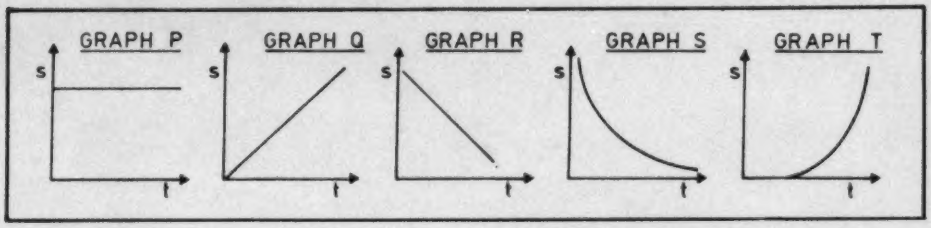
This test is designed to measure your ability to interpret the shapes graphs.
For each question choose the graph which best fits that statement and write the letter of the answer (A,B,C or D) on your answer sheet.

SET 1: The next 10 questions refer to the graphs below.



Q	STATEMENT In which graph does ...	GRAPH			
		A	B	C	D
1.	X increase as Y stays constant?	E	F	I	J
2.	X = 0, when Y = 0?	E	F	H	K
3.	X increase as Y increases?	E	F	I	K
4.	X have 2 values when Y = 0?	R	J	K	L
5.	X stay constant as Y increases?	E	G	H	J
6.	X decrease as Y decreases?	E	F	I	J
7.	Y = 5, when X = 0?	E	F	J	L
8.	Y increase then decrease?	H	I	K	L
9.	X = 10, when Y = 0?	F	H	J	K
10.	X increase faster than Y?	F	H	I	J

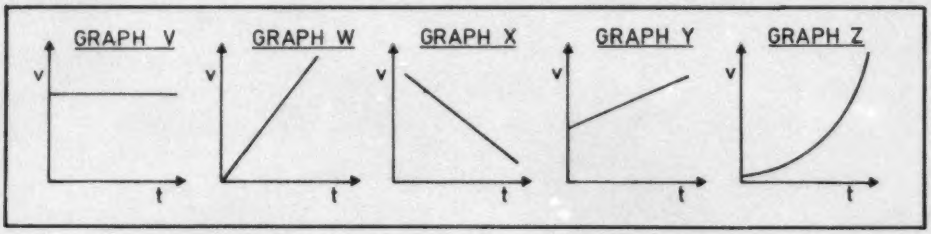
Set 2: The next 5 questions refer to the graphs below.



s = distance from starting point in metres
t = time in seconds

Q	STATEMENT	GRAPH			
	Which graph shows an object which is	A	B	C	D
11.	moving with constant velocity?	P	Q	S	T
12.	not moving?	P	R	S	T
13.	accelerating?	P	Q	R	T
14.	slowing down at a constant rate?	P	Q	S	T
15.	decelerating?	Q	R	S	T

Set 3: The next 5 questions refer to the graphs below.



v = velocity in metres/sec.
t = time in seconds

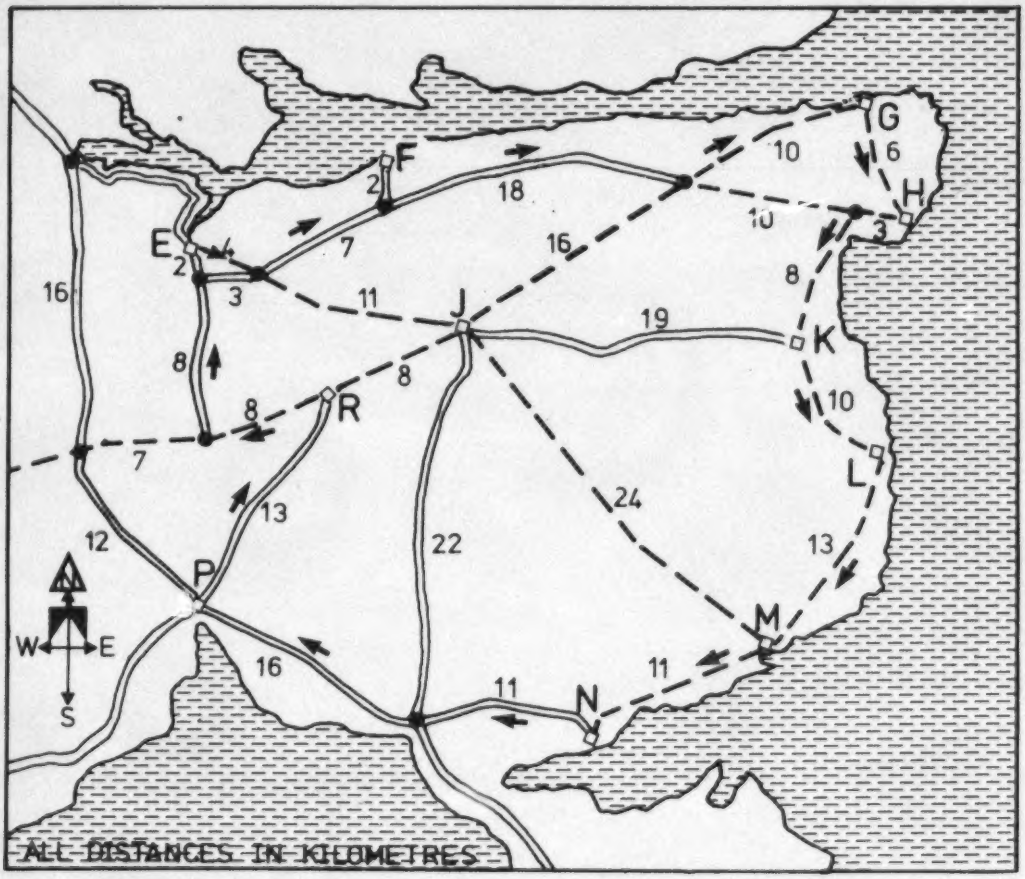
Q	STATEMENT	GRAPH			
	Which graph shows an object which is	A	B	C	D
16.	moving with constant velocity?	V	W	X	Z
17.	accelerating constantly?	V	W	X	Z
18.	slowing down?	W	X	Y	Z
19.	falling freely?	V	X	Y	Z
20.	not moving at t = 0?	W	X	Y	Z

READING A MAP - 2

This test is designed to test your ability to read a road map.

For each question below, select the correct answer and write its letter (A,B,C or D) on your answer sheet.

The questions refer to the map below. The map shows the positions of several towns (represented by the letters E - R) and the distances, in kilometres, along various interconnecting roads.



KEY

TOWN ▫ G

MAJOR ROAD ═══

BUSH TRACK - - -

INTERSECTION •

Set 1

What is the length of the shortest route from the town mentioned?

Q	Towns	Shortest Route (km)			
		A	B	C	D
1.	E to P	22	29	31	36
2.	H to P	45	47	50	51
3.	F to M	42	44	56	69
4.	F to L	48	50	58	65
5.	K to P	40	57	61	81

Set 2: Which town is closest to that given?

Q	Town	Closest town			
		A	B	C	D
6.	E	F	J	K	P
7.	J	K	M	N	P
8.	G	F	J	M	N
9.	P	E	J	L	M
10.	L	G	J	N	P

Set 3

Which town lies in the direction stated from each town mentioned?

Q	Which town lies	Town in that direction			
		A	B	C	D
11.	NE of town N?	G	J	L	R
12.	S of town E?	F	J	N	P
13.	W of town M?	J	L	N	P
14.	SE of town F?	E	K	L	M
15.	W of town K?	F	J	N	P

Set 4

Answer the following questions about the journey, indicated by the arrows, and starting from E and ending at E.

Q	Question	A	B	C	D
16.	Which town is passed through after E?	F	G	H	K
17.	How long is the complete journey, following the arrow? (km)	146	148	149	151
18.	In which direction does the journey go after leaving L?	SSE	SE	SW	SSW
19.	How much shorter would the journey be if it went through J to K?	19	22	27	34
20.	Which two parts of the journey are of equal length?	EG & MP	PN & GL	HM & PE	EG & NR

USING $v = u + at$

This test is designed to test your ability to use the equation $v = u + at$ to find an unknown quantity.

For each question choose the correct answer and mark its letter (A,B,C or D) on your answer sheet.

Each of the questions refers to the following equation of uniformly accelerated motion.

$v = u + at$ where

v = final velocity in ms^{-1}

u = initial velocity in ms^{-1}

a = acceleration in ms^{-2}

t = time change in s

Set 1: In each question determine the final velocity.

Q	u ms^{-1}	a ms^{-2}	t (s)	Final velocity ms^{-1}			
				A	B	C	D
1.	0	2	1.5	0	1	2	3
2.	2	3	2	4	6	7	8
3.	5	4	3	12	15	17	60
4.	10	-2	4	2	0	-8	-20
5.	20	-3	5	-15	-12	5	33

Set 2: In each question, you are given the *initial velocity*, the *final velocity*, and the *acceleration*. Use the formula to calculate the *time* (t) during which the body must have accelerated.

Q	u ms^{-1}	v ms^{-1}	a ms^{-2}	Time (s)			
				A	B	C	D
6.	0	10	2	2	5	12	20
7.	5	20	3	2	5	6.66	8.33
8.	6	18	4	1.5	2	3	6
9.	2	12	5	0.4	2.0	2.2	2.8
10.	3	39	9	0.33	3	4	12

Set 3: In each question determine the magnitude of the acceleration.

Q	u ms^{-1}	v ms^{-1}	t (s)	Acceleration ms^{-2}			
				A	B	C	D
11.	0	10	2	2	5	10	20
12.	6	12	3	2	6	18	36
13.	30	10	5	2	-4	6	-8
14.	15	0	3	1	-3	-5	7
15.	60	20	4	5	8	-10	12

Set 4: In each question determine the initial velocity.

Q	v ms^{-1}	a ms^{-2}	t (s)	Initial velocity ms^{-1}			
				A	B	C	D
16.	30	3	6	8	12	16	39
17.	10	2	3	2	4	5	15
18.	15	5	1	2.5	4	9	10
19.	50	3	10	9	15	20	90
20.	27	9	3	0	1	3	9

Set 5: In each question determine the size of the missing quantity, P, Q, R, S and T.

Q	u ms^{-1}	v ms^{-1}	t (s)	a ms^{-2}	Missing quantity			
					A	B	C	D
21.	P	10	4	2	1	2	3	4
22.	0	8	Q	2	1	2	3	4
23.	1	R	1	1	1	2	3	4
24.	2	6	4	S	1	2	3	4
25.	T	9	3	2	1	2	3	4

M87

OHM'S LAW - 2 RESISTORS

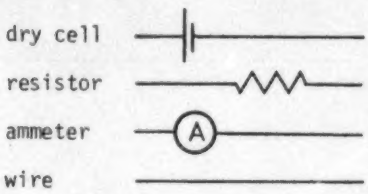
This test is designed to measure your ability to apply the Ohm's Law equation to electrical circuits.
For each question below, choose the correct answer and write its letter (A,B,C or D) on your answer sheet.

You may need the following information to answer the questions:

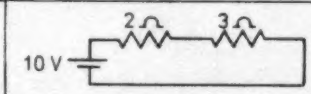
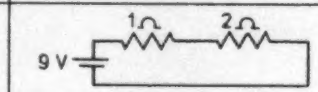
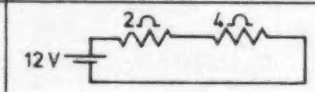
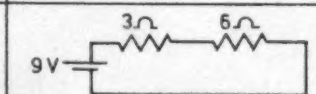
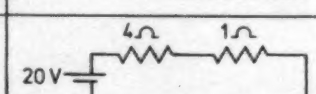
a. All of the circuits given contain two resistors in series.

b. The equation for Ohm's Law is V = IR
where V = potential difference in volts
I = current in amps
R = resistance in ohms

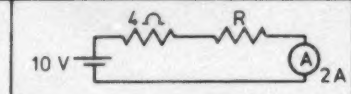
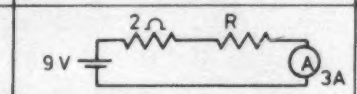
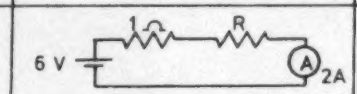
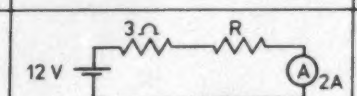
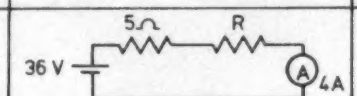
c. KEY



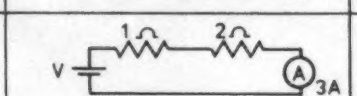
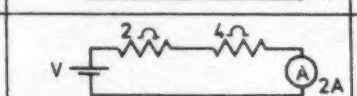
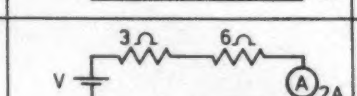
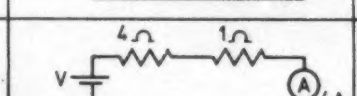
SET 1: What is the current flowing in each of the circuits shown in questions 1 - 5?

Q	CIRCUIT	CURRENT FLOWING (amps)			
		A	B	C	D
1		1·6	2	3·3	5
2		3	4·5	9	12
3		1·5	2	3	6
4		0·5	1	1·3	3
5		4	5	20	25

Set 2: What is the value for the resistor (R) in each circuit shown in questions 6-10?

Q	CIRCUIT	RESISTANCE R IN OHMS			
		A	B	C	D
6		1	2	5	10
7		1	2	3	4·5
8		1	2	3	6
9		1	2	3	4
10		1	2	3	4

Set 3: What is the potential difference of the dry cell in each of the circuits shown in questions 11-15?

Q	CIRCUIT	POTENTIAL DIFFERENCE (VOLTS)			
		A	B	C	D
11		4	6	10	12
12		1	3	6	9
13		4	8	12	16
14		6	12	18	36
15		1	4	16	20

M88

FILTRATION

This test is designed to measure your ability to apply information about substances to their separation by filtration.

For each question choose the correct answer and write its letter (A, B, C or D) on your answer sheet.

The questions which follow refer to the table of information below.

Substance	Boiling Point of Substance °C	State at room temperature (25°C)	Is substance soluble in ...			
			Water?	M?	N?	Q?
M	100	Liquid	Yes	Yes	Yes	Yes
N	65	Liquid	Yes	Yes	Yes	No
P	1300	Solid	Yes	No	No	Yes
Q	250	Liquid	No	Yes	No	Yes
R	1000	Solid	No	Yes	No	No
S	800	Solid	Yes	No	Yes	No
T	1600	Solid	Yes	Yes	Yes	Yes

Set 1: In questions 1 - 5, choose the pair of substances which are best separated from each other by *filtration*.

Question	A	B	C	D
1.	M + P	M + Q	M + R	M + T
2.	M + N	M + S	N + S	N + T
3.	N + S	P + N	P + S	P + T
4.	N + T	M + T	R + N	R + S
5.	M + Q	P + Q	S + Q	T + Q

Set 2: Which pair of substances could be separated from each other by adding the liquid mentioned, stirring then filtering off the undissolved solid?

Q	Liquid Added	Pairs of Substances			
		A	B	C	D
6.	Water	P + S	P + T	R + S	S + T
7.	M	N + Q	P + R	P + S	R + T
8.	N	M + S	P + Q	S + T	R + T
9.	Q	P + S	P + T	N + R	R + S
10.	Mixture of M&N	P + R	R + S	R + T	P + T

Set 3: Which liquids could be used to separate the following mixtures by dissolving one of the substances of the mixture and allowing it to be separated from the other by filtering.

Q	Mixture	Liquids which could be used			
		A	B	C	D
11.	R + T	M only	N + Q	N + M	M + Q
12.	P + S	Water	M only	N only	N + Q
13.	P + T	Water	Q only	M + N	M + Q
14.	S + T	M + Q	N + Q	M, N, Q	N only
15.	S + R	Water + Q	M + Q	Water, M + N	Q only

M89

METRIC LENGTH

This test is designed to measure your ability to convert millimetres, centimetres, metres and kilometres to each other.

For each question choose the correct answer and write its letter, (A,B,C or D) on your answer sheet.

Set 1: Convert each of the measurements below to millimetres.

Question	Measurement in cm.	Measurement in mm.			
		A	B	C	D
1	7	0.7	7	70	700
2	20	0.20	2.0	20	200
3	5.6	0.56	5.6	56	560
4	0.3	0.3	3.0	30	300
5	15.7	0.157	1.57	15.7	157

Set 2: Convert each of the measurements below to centimetres.

Question	Measurement in mm.	Measurement in cm.			
		A	B	C	D
6	7	0.07	0.7	7	70
7	118	0.118	1.18	11.8	118
8	20	0.20	2.0	20	200
9	10.7	1.07	10.7	107	1070
10	0.6	0.006	0.06	0.6	60

Set 3: Convert each of the measurements below to metres.

Question	Measurement in cm.	Measurement in metres			
		A	B	C	D
11	9	0.09	0.9	9	900
12	65	0.065	0.65	6.5	65
13	487	0.487	4.87	48.7	4870
14	9000	0.9	9	90	900
15	250 000	2.5	25	250	2500

Set 4: Convert each of the measurements below to centimetres.

Question	Measurement in metres	Measurement in centimetres			
		A	B	C	D
16	0.06	0.6	6	60	600
17	0.15	1.5	15	150	1500
18	3.72	0.372	37.2	372	3720
19	16.45	0.1645	1.645	164.5	1645
20	136.0	1.36	13.6	1360	13 600

Set 5: Convert each of the measurements below to metres.

Question	Measurement in km	Measurement in metres			
		A	B	C	D
21	100	10	1000	10 000	100 000
22	75	7.5	750	7500	75 000
23	3.6	36	360	3600	36 000
24	0.4	4	40	400	4000
25	0.09	9	90	900	9000

Set 6: Convert each of the measurements below to kilometres.

Question	Measurement	Measurement in kilometres			
		A	B	C	D
26	600 cm	0.006	0.06	0.6	6
27	1500 cm	0.0015	0.015	0.15	1.5
28	18 m	0.018	0.18	1.8	180
29	460 m	0.46	4.60	46	4600
30	5300 m	5.3	53	530	5 300 000

M90

SOLUBILITY RULES

This test is designed to measure your ability to interpret solubility rules.

For each question choose the correct answer (A,B,C or D) and write on your answer sheet.

The questions on the opposite page refer to these rules and tables. The rules and tables give the solubility of various anions in water.

Rule 1: The chlorides, bromides, iodides, nitrates and sulfates of all metals are soluble in water *except* those shown in Table 1.

Table 1: Shows which chlorides, bromides, iodides, nitrates and sulfates are Insoluble in water

TABLE 1	THESE ARE INSOLUBLE
Chloride	Silver, lead, mercury
Bromide	Silver, lead, mercury
Iodide	Silver, lead, mercury
Nitrate	None
Sulfate	Barium, mercury, lead, calcium, silver

Rule 2: The phosphates, carbonates, hydroxides and sulfides of all metals are insoluble in water *except* those shown in Table 2.

Table 2: Shows which phosphates, carbonates, hydroxides and sulfides are soluble in water.

TABLE 2	THESE ARE SOLUBLE
Phosphate	Sodium, potassium, ammonium, caesium
Carbonate	Sodium, potassium, ammonium, caesium
Hydroxide	Sodium, potassium, ammonium, barium, calcium, caesium
Sulfide	Sodium, potassium, ammonium, calcium, magnesium, barium

Set 1: Which of the four compounds in each question is *soluble*?

Q	Compounds			
	A	B	C	D
1.	Silver Chloride	Lead Chloride	Mercury Chloride	Sodium Chloride
2.	Lead Bromide	Mercury Iodide	Silver Nitrate	Barium Sulfate
3.	Calcium Nitrate	Calcium Sulfate	Calcium Carbonate	Lead Iodide
4.	Lead Carbonate	Potassium Chloride	Silver Sulfate	Barium Phosphate
5.	Copper Hydroxide	Copper Nitrate	Iron Carbonate	Silver Phosphate

Set 2: Which of the four compounds in each question is *insoluble*?

Q	Compounds			
	A	B	C	D
6.	Lead Iodide	Potassium Phosphate	Ammonium Hydroxide	Copper Chloride
7.	Magnesium Carbonate	Lead Nitrate	Zinc Chloride	Sodium Hydroxide
8.	Calcium Chloride	Silver Nitrate	Lead Carbonate	Barium Hydroxide
9.	Copper Nitrate	Caesium Bromide	Calcium Nitrate	Barium Sulfate
10.	Ammonium Phosphate	Zinc Hydroxide	Sodium Carbonate	Copper Carbonate

Set 3: Which compound of each element is *soluble*?

Q	Element	Compounds			
		A	B	C	D
11.	Lead	Carbonate	Chloride	Nitrate	Sulfide
12.	Iron	Bromide	Carbonate	Hydroxide	Phosphate
13.	Copper	Iodide	Hydroxide	Phosphate	Sulfide
14.	Calcium	Carbonate	Chloride	Phosphate	Sulfate
15.	Manganese	Carbonate	Hydroxide	Phosphate	Sulfate

Set 4: Which compound of the element mentioned is *insoluble*?

Q	Element	Compounds			
		A	B	C	D
16.	Zinc	Chloride	Nitrate	Bromide	Phosphate
17.	Magnesium	Carbonate	Sulfate	Iodide	Nitrate
18.	Tin	Nitrate	Hydroxide	Chloride	Sulfate
19.	Barium	Phosphate	Chloride	Sulfide	Hydroxide
20.	Calcium	Chloride	Sulfide	Sulfate	Nitrate

M91

PHYSICAL SEPARATIONS

This test is designed to measure your ability to choose various methods of separating substances.

For each question choose the correct answer and then write its letter (A, B, C or D) on your answer sheet.

The questions refer to the information in the table below.

SUBSTANCES TO BE SEPARATED	METHOD
Undissolved solids from liquids	FILTRATION
Dissolved solids from solution	EVAPORATION
Pure dissolved solid from a solution	CRYSTALLISATION
Pure liquid from dissolved solid	DISTILLATION
Pure liquid from a mixture of liquids	FRACTIONAL DISTILLATION
Soluble solids from insoluble solids	DISSOLVING
Suspended solid from liquids	CENTRIFUGE

Set 1: Which method would be best to use to separate the following mixtures. The first substance named is the one to be collected.

Q	MIXTURE	A	B	C	D
1.	Clay from muddy water.	Distillation	Dissolving	Fractional distillation	Filtration
2.	Salt from water.	Evaporation	Filtration	Centrifuging	Dissolving
3.	Water from copper sulfate solution.	Fractional distillation	Distillation	Evaporation	Dissolving
4.	Salt from sand.	Filtration	Evaporation	Distillation	Dissolving
5.	Salt from seawater.	Centrifuging	Filtration	Crystallisation	Fractional distillation

The questions refer to the information in the table below.

SUBSTANCES TO BE SEPARATED	METHOD
Undissolved solids from liquids	FILTRATION
Dissolved solids from solution	EVAPORATION
Pure dissolved solid from a solution	CRYSTALLISATION
Pure liquid from dissolved solid	DISTILLATION
Pure Liquid from a mixture of liquids	FRACTIONAL DISTILLATION
Soluble solids from insoluble solids	DISSOLVING
Suspended solid from liquids	CENTRIFUGE

Set 2: Which two substances could be completely separated using the method indicated?

Q	METHOD	A	B	C	D
6.	Filtration	Salt and Water	Sugar and Water	Sand and Water	Alcohol and Water
7.	Evaporation	Alcohol and Water	Salt and Sand	Salt and Water	Salt and Sugar
8.	Distillation	Salt and Water	Alcohol and Water	Muddy Water	Sugar and Sand
9.	Fractional distillation	Sand and Water	Alcohol and Water	Sand and Salt	Water and Sugar
10.	Dissolving	Salt and Water	Salt and Sand	Salt and Sugar	Salt, Sand and Sugar

Set 3: Which differing physical property is used in each method below?

Q	METHOD	PHYSICAL PROPERTY			
		A	B	C	D
11.	Filtration	Solubility	Boiling Point	Particle Size	Density
12.	Evaporation	Solubility	Boiling Point	Particle Size	Density
13.	Fractional distillation	Solubility	Boiling Point	Particle Size	Density
14.	Dissolving	Solubility	Boiling Point	Particle Size	Density
15.	Crystallisation	Solubility	Boiling Point	Particle Size	Density

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